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My Labster Experience: Ana Barral, National University

Dr. Ana Maria Barral teaches Microbiology at National University in California. She was first introduced to Labster in the fall of 2018 as part of a pilot project that the University initiated in collaboration with the [Precision Institute](#).

The Precision Institute at National University leads a four-year, \$20 million initiative, called Precision Education, which pilots new approaches to personalize higher education through advanced technologies. The intent is to serve a diverse student population and help college completion by adapting the material to individual student needs and interests. Labster was chosen to help migrate some of the University's science courses online.

As a part of this initiative, Dr. Barral and four of her colleagues piloted Labster. As the coordinator of the pilot for Microbiology, Dr. Barral explained to Labster how she had first been somewhat skeptical of the new tool, due to previous experiences: "We decided to implement Labster quite slowly, to make sure it worked first. We have piloted new technologies before, and some crashed and burned. If a virtual lab only works in a certain operating system, or it requires very fast broadband internet, or overall has too many technical issues, then you risk having a large number of frustrated and dissatisfied students."



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But with Labster the experience for Dr. Barral and her colleagues was different: "One of the things I like about Labster is the responsiveness and support. Whenever you are trying a new product you need assistance. Sometimes people sell you a product and they disappear. But Labster is very communicative and it's easy to ask questions and receive answers," Dr. Barral said.

Teaching Introductory Microbiology with virtual labs

Dr. Barral uses four of Labster's desktop simulations in her course: [Bacterial Quantification](#), [Bacterial Isolation](#), [Biosafety and Pasteurization](#) and [Sterilization](#). The simulations combine concepts and skills, and allow Dr. Barral's students to become familiar with important topics in Microbiology.

The simulations are embedded in the university's LMS, Blackboard, so that the students can access them with ease and complete them as a home assignments. Dr. Barral introduces students to the simulations at the beginning of the course: "In class I give a short demonstration of how it works, which enables the students to then do the simulations in their own time from home."

Dr. Barral uses the simulations in a blended learning format to prepare her students for the hands-on lab component: "I will refer to the simulations in the lab and ask the students 'do you remember how you practised this and that in the simulation? So I try to connect the simulation to the real life experiment,'" she explained.

Realistic, data-rich, risk-free learning environments

Having used the simulations for almost a year now, Dr. Barral described to Labster a number of advantages she had found so far: "I like how realistic the simulations are. I think there's a great attention to detail. I have used simulations in other contexts where the instructions say 'pipette this or that' and everything works, but it isn't very realistic. With Labster, you can see the effort that was put in to make it realistic. For example, if the pipetting steps are not done in the correct order, it doesn't work. So students have to go back and redo it until they get it right. It gives the students a much more realistic learning experience."

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Another benefit Dr. Barral mentioned was the availability of quantitative data in the simulations: "One of the main issues we had with undergraduate laboratory activities before was that they rarely provided quantitative data, which is not how real life science works. I really like that Labster exposes students to numbers and calculations. It makes them more familiar with how things work in real life."

A third benefit Dr. Barral mentioned about Labster's simulations was that it provided her students with the opportunity to learn and experiment in a safe, risk-free environment: "The Labster assignments are low stake assignments. In a real lab, students may feel stressed to get it right. With Labster, they can make mistakes, go back, and repeat it several times until they get the desired outcome."

Dr. Barral also explained how she had explored using Labster in another course she teaches, a fully online General Biology lab course for non-majors. "This is an online course where students are often placed all over the world. Our university has many military students, and often they are deployed and taking classes on a ship or a military base. That means they cannot use a lab kit to do experiments like other remote students do. I've introduced Labster to them as a mini experiment and they have been very happy with that. They were able to analyze numbers and they found it very interesting. So virtual labs definitely help when you don't have a hands-on lab available."

Expectations vs. outcomes

To measure the effect of Labster, Dr. Barral and her colleagues used post-quiz questions that were previously used in a [published article](#), and compared Labster students' scores with students from traditional courses. "The preliminary results of our research show higher scores for Labster students compared to their traditional counterparts. The questions addressed concepts found in the laboratory activities with questions probing students' critical thinking skills," she said.

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This is not the first time Dr. Barral tried new technology tools in her teaching, and so she wanted to share her advice for peers wanting to use Labster with their students: "I recommend teachers who will be using Labster to complete the simulations themselves first. Because once I ran it, I understood how it worked and appreciated it more. It makes it easier to understand the issues your students have with the simulations, and you can tell them, if they get stuck, how to solve the issue and move on."

Making a change in science education

Last, Dr. Barral described how Labster could help students gain a better appreciation of laboratory sciences using realistic simulations. "I like how it works. It may even help to solve issues like the digital divide. If we can make it more available, it will allow a lot of students who don't live close to a lab and who don't have access to lab facilities, to gain a better understanding of science."

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"I experienced that myself with one of Labster's simulations," Dr. Barral continued. "I had never worked in a BSL-3 Biosafety lab before Labster." (In Labster's [Biosafety](#) simulation, students are able to experience a containment level 3 (Biosafety level 3 or BSL3) research laboratory, and get to work with a potential bioterrorism agent.) "It was really cool to experience all the safety steps required to work in this environment. That was an eye opener even for me. I can only imagine a student who has never been in a lab before—they have to put on the lab coat and gloves and take all these safety measures—and it really does give insight into how a lab works. So I think that's a great thing about Labster's simulations. By providing an almost game-like, realistic environment, Labster may be able to help students interested in science to succeed in the introductory courses that are often challenging due to the overload of new concepts and language."

"We also need to make science education more inclusive," Dr. Barral mentioned as a second matter, for which she believed Labster could make a difference. "In the US we have a sad issue that when you look up minorities they are very underrepresented in STEM. So for those who are interested in science, and who want to become a scientist, our main challenge is not to discourage them, but to help them. One way to make science more attractive is to make it real. And for me, one thing that Labster does really well is to make it real and fun. Labster brings both humor and relevance, as well as real life context to science education."

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